

Facility Specific Phosphorus Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Gays Mills			
B. Facility Name: Gays Mills Wastewater Treatment Facility			
C. Submitted by: Wisconsin Department of Natural Resources			
D. State: Wisconsin	Substance: Phosphorus	Date completed: August 3, 2020	
E. Permit #: WI-0022268-10-0	WQSTS #:	(EPA USE ONLY)	
F. Duration of Variance	Start Date: January 1, 2021	End Date: December 31, 2025	
G. Date of Variance Application: January 13, 2020			
H. Is this permit a: <input checked="" type="checkbox"/> First time submittal for variance <input type="checkbox"/> Renewal of a previous submittal for variance (Complete Section X)			

I. Description of proposed variance:

The Village of Gays Mills is seeking an individual phosphorus variance from the total phosphorus water quality criterion (WQC) of 100 ug/L (0.100 mg/L) contained in s. NR 102.06, Wis. Adm. Code, for the Kickapoo River. The water quality-based effluent limits (WQBELs) calculated in accordance with the formula in s. NR 217.13, Wis. Adm. Code, result in total phosphorus WQBELs of 0.1 mg/L and 0.073 lbs/day as 6-month averages and 0.3 mg/L as a monthly average. Given the small size of this facility, a technology-based phosphorus limitation was not warranted in previous WPDES permits. The Village of Gays Mills was issued a WPDES permit containing the phosphorus WQBELs on June 2, 2015. During the previous permit term, Gays Mills evaluated its compliance options and determined that adaptive management was not practical and plant upgrades to meet the phosphorus WQBELs were not economically feasible. The effluent phosphorus concentration for this discharge is currently 2.54 mg/L (30-day 99th percentile). This phosphorus concentration reflects on-site phosphorus optimization measures that occurred during the previous permit term. The proposed permit contains a requirement to implement a phosphorus pollutant minimization program (PMP) and optimize phosphorus removal at the treatment plant. During the upcoming permit term Soldiers Grove plans to perform sewer collection system improvements to reduce excessive inflow and infiltration during flood events that negatively affect overall treatment plant performance, including phosphorus removal. Joint treatment with the Village of Soldiers Grove will also be evaluated and water quality trading opportunities identified that, if determined feasible, would be implemented in future permit terms.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Phillip Spranger	philip.spranger@wisconsin.gov	608-273-5969	Parts I A-I, II A-C, III A-F, V-VIII
Julia Stephenson	julia.stephenson@wisconsin.gov	608-785-9981	Parts II J & M, IV D and X A & B
Benjamin Hartenbower	benjamin.hartenbower@wisconsin.gov	715-225-4705	Parts II D-H and K-N, III G-H

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought:	100 ug/L (0.100 mg/L) (s. NR 102.06(3), Wis. Adm. Code)
B. List other criteria likely to be affected by variance: None	
C. Source of Substance: The Village of Gays Mills Wastewater Treatment Facility discharges to the Kickapoo River located in the Lower Kickapoo River Watershed in the Lower Wisconsin River Basin in Crawford County. The watershed area above Gays Mills is 616.15 mi ² . Land use is primarily agricultural (51%), followed by forest (44%) and urban (5%) with much smaller amounts of barren land, wetlands, grassland and open water. According to the Pollutant Load Ratio Estimation Tool (PRESTO) model, >99% of the phosphorus comes from nonpoint sources.	
Citation: PRESTO is a statewide GIS-based tool that compares the average annual phosphorus loads originating from point and nonpoint sources within a watershed. More information about this model is available at http://dnr.wi.gov/topic/surfacewater/presto.html .	

D. Ambient Substance Concentration: 0.136-0.215 mg/L		<input checked="" type="checkbox"/> Measured	<input type="checkbox"/> Estimated
		<input type="checkbox"/> Default	<input type="checkbox"/> Unknown
E. If measured or estimated, what was the basis? Include citation. Six samples (NR 217 Median = 0.221 mg/L) taken at monitoring station 533027 from 10/28/2009 to 09/06/2010 and twelve samples (NR 217 Median = 0.118 mg/L) taken at monitoring station 10029649 from 05/17/2015 to 10/16/2016.			
F. Average effluent discharge rate: 0.074 MGD July 2015 to January 2020		Maximum effluent discharge rate: 0.558 MGD 7/24/2017	
G. Effluent Substance Concentration:		<input checked="" type="checkbox"/> Measured	<input type="checkbox"/> Estimated
1-day P99 5.8		<input type="checkbox"/> Default	<input type="checkbox"/> Unknown
4-day P99 3.6			
30-day P99 2.54			
Mean 2.02			
H. If measured or estimated, what was the basis? Include Citation. Calculated Upper 99 th Percentiles and Mean phosphorus concentration in the effluent reported from July 2015 to January 2020.			
I. Type of HAC:		<input type="checkbox"/> Type 1: HAC reflects waterbody/receiving water conditions <input type="checkbox"/> Type 2: HAC reflects achievable effluent conditions <input checked="" type="checkbox"/> Type 3: HAC reflects current effluent conditions	
J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its phosphorus PMP. Thus, the HAC at commencement of this variance is 3.6 mg/L, which reflects the greatest phosphorus reduction achievable with the current treatment processes, in conjunction with the implementation of the permittee's phosphorus PMP. The current effluent condition is reflective of on-site optimization measure that have already occurred. This HAC determination is based on the economic feasibility of available compliance options for Gays Mills Wastewater Treatment Facility at this time (see Economic Section below). The permittee may seek to renew this variance in the subsequent reissuance of this permit; the Department will reevaluate the HAC in its review of such a request. A subsequent HAC cannot be defined as less stringent than this HAC.			
K. Variance Limit: 3.6 mg/L			
L. Level currently achievable (LCA): 3.6 mg/L			
M. What data were used to calculate the LCA, and how was the LCA derived? (Immediate compliance with LCA is required.) The 4-day P99 from July 2015 to January 2020 is 3.6 mg/L			
N. Explain the basis used to determine the variance limit (which must be \leq LCA). Include citation. The current interim limit is 3.6 mg/L. The 4-day P99 was determined as the level currently achievable due to the weekly monitoring frequency (~4 samples/month).			
O. Select all factors applicable as the basis for the variance provided under 40 CFR 131.10(g). Summarize justification below:		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6	
During the previous permit term Gays Mills evaluated its regulatory, technical and financial options for meeting phosphorus WQBELs contained in its WPDES permit. It was determined that the existing treatment plant was located in the mapped Regulatory Floodplain and major upgrades or construction of a new treatment plant would not be allowed at the existing site. All options for complying with phosphorus WQBELs through treatment would involve construction of a new treatment plant located at a new site and all options would result in annual residential sewer user costs in excess of 2% of Gays Mills' MHI.			
Citation: 4th Year Phosphorus Report (Facility Plan)			
Section III: Location Information			
A. Counties in which water quality is potentially impacted:		Crawford County	
B. Receiving waterbody at discharge point:		Kickapoo River	
C. Flows into which stream/river?		Wisconsin River	How many miles downstream? ~40 mi.

D. Coordinates of discharge point (UTM or Lat/Long):	43.3146 N, -90.8491 W												
E. What are the designated uses associated with this waterbody? Full Fish and Aquatic Life, Warm Water Sport Fishery													
F. Describe downstream waters: The Kickapoo River at Gays Mills is not 303(d) listed; however, approximately 14 miles downstream, in the vicinity of Stueben, Wisconsin, a six mile stretch of the Kickapoo is 303(d) listed for total phosphorus impairments. Approximately another 23 miles downstream from this impaired segment the Kickapoo River meets the Wisconsin River. At this point the Wisconsin River is classified as an Exceptional Resource Water and is not phosphorus impaired.													
G. What is the distance from the point of discharge to the point downstream where the concentration of the substance falls to less than or equal to the applicable criterion of the substance? The Kickapoo River is likely above the phosphorus criterion from the outfall location downstream (~40-mile stretch) to where it enters the Wisconsin River. The phosphorus concentration in the Wisconsin River at this confluence is unknown but may possibly remain below the criterion since the furthest downstream monitoring point is in Muscoda (0.096 mg/L). The Mississippi River is phosphorus impaired where the Wisconsin River enters, downstream.													
H. Provide the equation used to calculate that distance. N/A													
I. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody: Ontario and Readstown have approved Total Phosphorus (TP) variances. Soldiers Grove also has an EPA approved Individual Phosphorus Variance, however the permit has not been issued as of August 2020. (All facilities are located upstream of Gays Mills.).													
Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet.													
J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list the impairments below. The Kickapoo River is not 303(d) listed at Gays Mills WWTF Outfall (~River Mile 40). <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown													
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="text-align: center;">River Mile</th><th style="text-align: center;">Pollutant</th><th style="text-align: center;">Impairment</th></tr></thead><tbody><tr><td>19.05 – 25.45</td><td>Total Phosphorus</td><td>Unknown</td></tr><tr><td>19.05 – 25.45</td><td>Mercury</td><td>Contaminated Fish Tissue</td></tr><tr><td>61.03 – 119.4</td><td>Total Phosphorus</td><td>Unknown</td></tr></tbody></table>	River Mile	Pollutant	Impairment	19.05 – 25.45	Total Phosphorus	Unknown	19.05 – 25.45	Mercury	Contaminated Fish Tissue	61.03 – 119.4	Total Phosphorus	Unknown	
River Mile	Pollutant	Impairment											
19.05 – 25.45	Total Phosphorus	Unknown											
19.05 – 25.45	Mercury	Contaminated Fish Tissue											
61.03 – 119.4	Total Phosphorus	Unknown											
Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)													
A. Are there any industrial users contributing phosphorus to the POTW? If so, please list. N/A – No local pretreatment program. No industrial contributors.													
B. Are all industrial users in compliance with local pretreatment limits for phosphorus? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc) N/A													
C. When were local pretreatment limits for phosphorus last calculated? N/A													
D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW N/A													
Section V: Public Notice Drafter													
A. Has a public notice been given for this proposed variance? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No													
B. If yes, was a public hearing held as well? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A													
C. What type of notice was given? <input type="checkbox"/> Notice of variance included in notice for permit <input type="checkbox"/> Separate notice of variance													
D. Date of public notice: _____ Date of hearing: _____													

E. Were comments received from the public in regards to this notice or hearing? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(If yes, please attach on a separate sheet)</i>
Section VI: Human Health
A. Is the receiving water designated as a Public Water Supply? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
B. Applicable criteria affected by variance:
C. Identify any expected impacts that the variance may have upon human health, and include any citations: There are no direct impacts to human health related to phosphorus.
Section VII: Aquatic Life and Environmental Impact
A. Aquatic life use designation of receiving water: Full Fish and Aquatic Life, Warm Water Sport Fishery.
B. Applicable criteria affected by variance: 100 ug/L (0.100 mg/L) total phosphorus water quality criterion (s. NR 102.06, Wis. Adm. Code).
C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations: Approximately 99% of the phosphorus in the Kickapoo river at Gays Mills is from non-point sources. Gays Mills WWTF's contributing load of phosphorus to the river is therefore not expected to adversely impact aquatic life beyond that which already results from non-point contributions.
D. List any Endangered or Threatened species known or likely to occur within the affected area, and include any citations: <div style="margin-left: 20px;"> Birds Whooping crane (<i>Grus americana</i>) – Experimental Population, Non-Essential Clams Higgins eye (pearlymussel) (<i>Lampsilis higginsii</i>) – Endangered Spectaclecase (mussel) (<i>Cumberlandia monodonta</i>) – Endangered Sheepsnose Mussel (<i>Plethobasus cyphus</i>) – Endangered Insects Rusty patched bumble bee (<i>Bombus affinis</i>) – Endangered Mammals Northern Long-Eared Bat (<i>Myotis septentrionalis</i>) – Threatened Reptiles Eastern Massasauga Rattlesnake (<i>Sistrurus catenatus</i>) – Threatened </div>
Section VIII: Economic Impact and Feasibility Drafter/Compliance Staff
A. Describe the permittee's current pollutant control technologies (treatment processes): Gays Mills Wastewater Treatment Facility treats domestic waste from the Village of Gays Mills. The facility has an annual average design flow of 0.087 million gallons per day (MGD) with actual annual average flow of 0.079 MGD over the past three years. The treatment facility has screening, contact stabilization, activated sludge and aerobic digestion. Effluent is disinfected seasonally via chlorination prior to discharge to the east bank of the Kickapoo River, ½ mile south of the Highway 171 bridge. Sludge is landspread on Department approved fields.
B. What modifications would be necessary to comply with the current limits? List additional treatment processes and/or technologies available. Include any citations.

During the previous permit term Gays Mills evaluated its regulatory, technical and financial options for meeting phosphorus WQBELs contained in its WPDES permit. It was determined that the existing treatment plant was located in the mapped Regulatory Floodplain and major upgrades or construction of a new treatment plant would not be allowed. All options for complying with phosphorus WQBELs through treatment would involve construction of a new treatment plant at a new site.

Excessive Inflow and Infiltration (I/I) is a significant issue in Gays Mills, as there is frequent flooding due to the location of parts of the collection system in the Mapped Regulatory floodway around the Kickapoo River. The peak day I/I is nearly 9 times the annual average design flow. A plan for collection system modifications to address I/I was developed, and the modifications are considered essential to all other treatment system options considered. The total cost of these collection system modifications is \$3,015,600, which would result in annual total sewer cost per residential user of \$1,460 or 3.52% of MHI. Sewer rates this high may cause substantial and widespread adverse social and economic impacts in the area where the permittee is located.

Gays Mills evaluated an Adaptive Management approach to meeting water quality criterion, but due to the size of the Kickapoo River watershed, ambient phosphorus concentrations that are twice the water quality criteria and the lack of staff time and expertise, Adaptive Management is not a feasible option. Gays Mills evaluated the cost of constructing and operating multiple treatment plant options to meet phosphorus WQBELs and as noted above, each option includes the collection system improvements project. Options evaluated included: a new Biological Phosphorus Removal (BPR) plant combined with a water quality trade (WQT); a new BPR plant with tertiary filtration; and a new Joint BPR Treatment plant serving Soldiers Grove, Gays Mills and potentially North Crawford Schools, with a WQT. The cost of constructing each of these treatment plant options exceeds \$7,900,000 with annual operation and maintenance costs over \$100,000. The lowest cost option, Joint BPR Plant with Soldiers Grove and WQT, would result in sewer user rates of 9.5% of Soldiers Grove MHI of \$41,477, making all of these options economically infeasible.

Citation: 4th Year Phosphorus Report (Facility Plan)

C. Identify any expected environmental impacts that would result from further treatment, and include any citations:

All available compliance options would reduce phosphorus concentrations in the Kickapoo River, and thus have net environmental benefits. Construction of traditional phosphorus treatment would have temporary environmental impacts related to construction activities.

D. Is it technically and economically feasible for this permittee to modify the treatment process to comply with the water quality-based limits? ☐ Yes ☒ No

E. If treatment is possible, is it possible to comply with the limits on the substance? ☐ Yes ☒ No

F. If yes, what prevents this from being done? Include any citations.

All treatment options for meeting the total phosphorus WQBELs would raise sewer user rates to greater than 2% of Median Household Income and therefore may cause substantial adverse social and economic impacts in the area served by the Gays Mills wastewater treatment facility.

G. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:

Gays Mills evaluated an Adaptive Management approach to meeting water quality criterion, but due to the size of the Kickapoo River watershed, ambient phosphorus concentrations that are twice the water quality criteria and the lack staff time and expertise, Adaptive Management is not a feasible option. Gays Mills evaluated the cost of constructing and operating multiple treatment plant options to meet phosphorus WQBELs and as noted above, each option includes the collection system improvements project. Options evaluated included: a new Biological Phosphorus Removal (BPR) plant combined with a water quality trade (WQT); a new BPR plant with tertiary filtration; and a new Joint BPR Treatment plant serving Soldiers Grove, Gays Mills and potentially North Crawford Schools, with a WQT. The cost of constructing each of these treatment plant options exceeds \$7,900,000 with annual operation and maintenance costs over \$100,000. The lowest cost option, Joint BPR Plant with Soldiers Grove and WQT, would result in sewer user rates of 9.5% of Gays Mills' MHI of \$41,477, making all of these options economically infeasible.

Citation: Gays Mills 4th Year Phosphorus Report

H. Describe the economic impacts of compliance: {applies only to municipalities; include other cost estimates for industries}

Economic Factor		Source
MHI	\$41,477	DNR Verified MHI for SFY2020 Projects
Calculated preliminary screener	N/A	
Secondary score value	N/A	

Section IX: Multi-Discharger Variance Feasibility (this assumes MDV approval)

A. Does the facility meet the economic indicators to qualify for the MDV? ☒ Yes ☐ No ☐ Unknown

MDV secondary indicator score: 5

B. Is it technically and economically feasible for this permittee to comply with a phosphorus WQBEL of 1 mg/L or lower? ☐ Yes ☒ No ☐ Unknown

C. Justification for considering an individual variance in lieu of the MDV:

Gays Mills is unable to meet the MDV interim limit of 0.8 mg/L (1.0 mg/L).

Section X: Compliance with Water Quality Standards

A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.

Gays Mills has optimized the overall wastewater treatment system performance for removal of conventional pollutants such as BOD and TSS, which also results in a reduction of the amount of phosphorus discharged. Monitor influent and effluent phosphorus concentrations to determine the effectiveness of the existing treatment process in removing phosphorus. Identify potential sources of phosphorus to the treatment plant to target phosphorus source reduction efforts.

Gays Mills evaluated the cost and effectiveness of a variety of options for constructing a new treatment plant, including a joint treatment option with the Village of Soldiers Grove and discussed potential Water Quality Trades with the Crawford County Land Conservation Department.

Citation: 3rd and 4th Year Phosphorus Reports

B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.

PMP Activities

1. Source Reduction

- Implement public education program.
- Obtain an Ortho PO₄ test kit.
- Compare field Ortho to lab Total Phosphorus.
- Test influent Ortho and Total Phosphorus 1x/week to check variability and establish a basis for design

2. Existing WWTP Phosphorus Treatment

- Test effluent Ortho and Total Phosphorus 1x/week.
- Change to Extended Aeration mode.
- Record supernatant return volumes and test phosphorus.
- General WWTP maintenance and housekeeping.

3. Phosphorus Chemical Treatment

- a. Pilot test alum using a drip feed direct to stilling well.
- b. Measure sludge production (gallons and % solids).
- c. Check Ortho P daily.
- 4. Biological Phosphorus Removal (BPR)
 - a. Change MLS pump settings to create Selector.
 - b. Add baffle and turn off air to expanded Selector at head of Aeration.
- 5. Water Quality Trading
 - a. Request WQT assistance from Crawford County Land Conservation Department.
 - b. Identify 1 or more WQT projects in 2020.
 - c. Obtain property owner WQT agreement by June 2021.
 - d. Construct 1 WQT project by end of 2022.
 - e. Prepare WQT Plan.
- 6. New WWTP and I/I Reduction
 - a. Meet with Village of Soldiers Grove to discuss joint WWTP.
 - b. Create Joint Sewerage Commission or proceed with Gays Mills WWTP.
 - c. Review 2006 Plans and known sources on Inflow.
 - d. Identify buildings in Flood Plain.
 - e. Record influent flow and flood stage.
 - f. TV 2006 Sewer.
 - g. TV remaining sewer in Flood Plain.
 - h. Complete scope for Collection System Modifications.
 - i. Start design Collection System Modifications.
 - j. Start design WWTP.
 - k. Finalize financing.
 - l. Start construction Collection System Modification.

Section XI: Compliance with Previous Permit (*Variance Reissuances Only*)

A. Date of previous submittal: <u> N/A </u>	Date of EPA Approval: _____
B. Previous Permit #: _____	Previous WQSTS #: _____ (EPA USE ONLY)
C. Effluent substance concentration: _____	Variance Limit: _____
D. Target Value(s): _____	Achieved? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partial

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No